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(56) Documents Cited  
EP 1060717 A WO 2001/035876 A  
DE 009100531 A US 5810754 A  
US 5776090 A US 5718673 A  
US 5609568 A

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(54) Abstract Title  
**ORTHOPAEDIC DEVICE**

(57) An orthopaedic device for alleviating the symptoms of foot drop comprising: a first portion arranged to encompass a circumference of a patient's leg between the knee and calf; a second portion arranged to receive a toe region of the patient; a third portion which is arranged to encompass the patient's leg in an ankle region; and a substantially inelastic strip of material attached at one end to the first portion and at the other end to the second portion, the third portion maintaining the inelastic strip in close contact with the patient's leg so that a degree of tension is maintained along the length of the strip to prevent the angle between the patient's leg and foot substantially exceeding 90°.

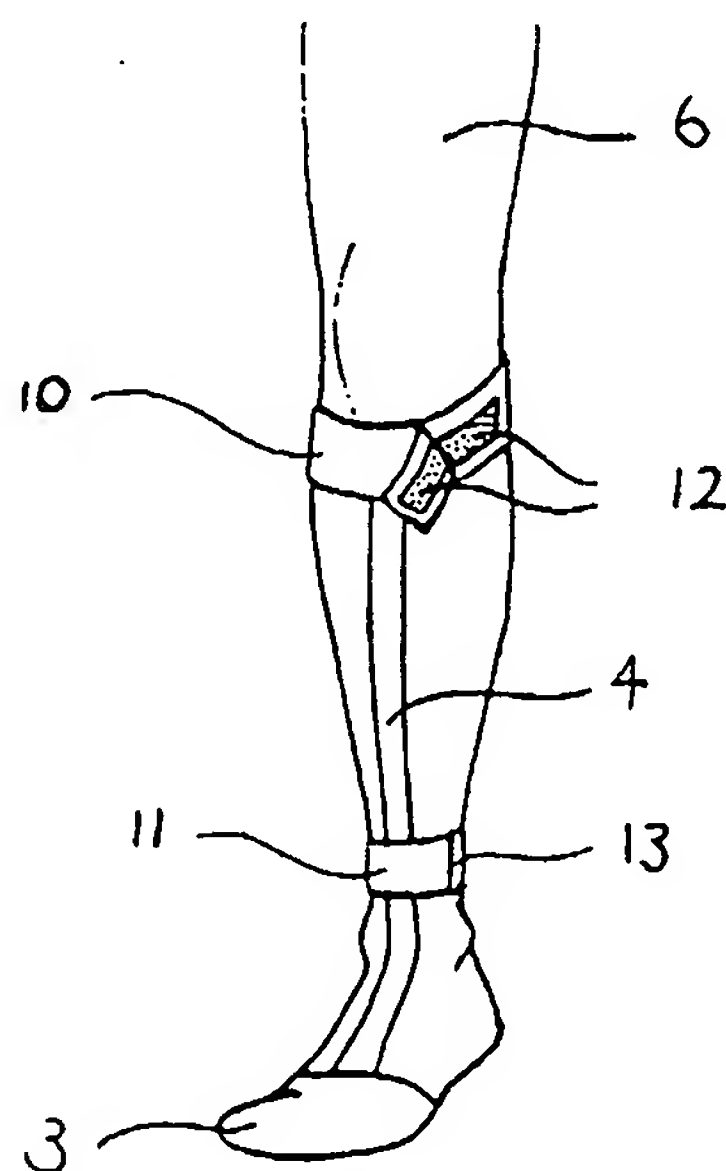


Fig. 3

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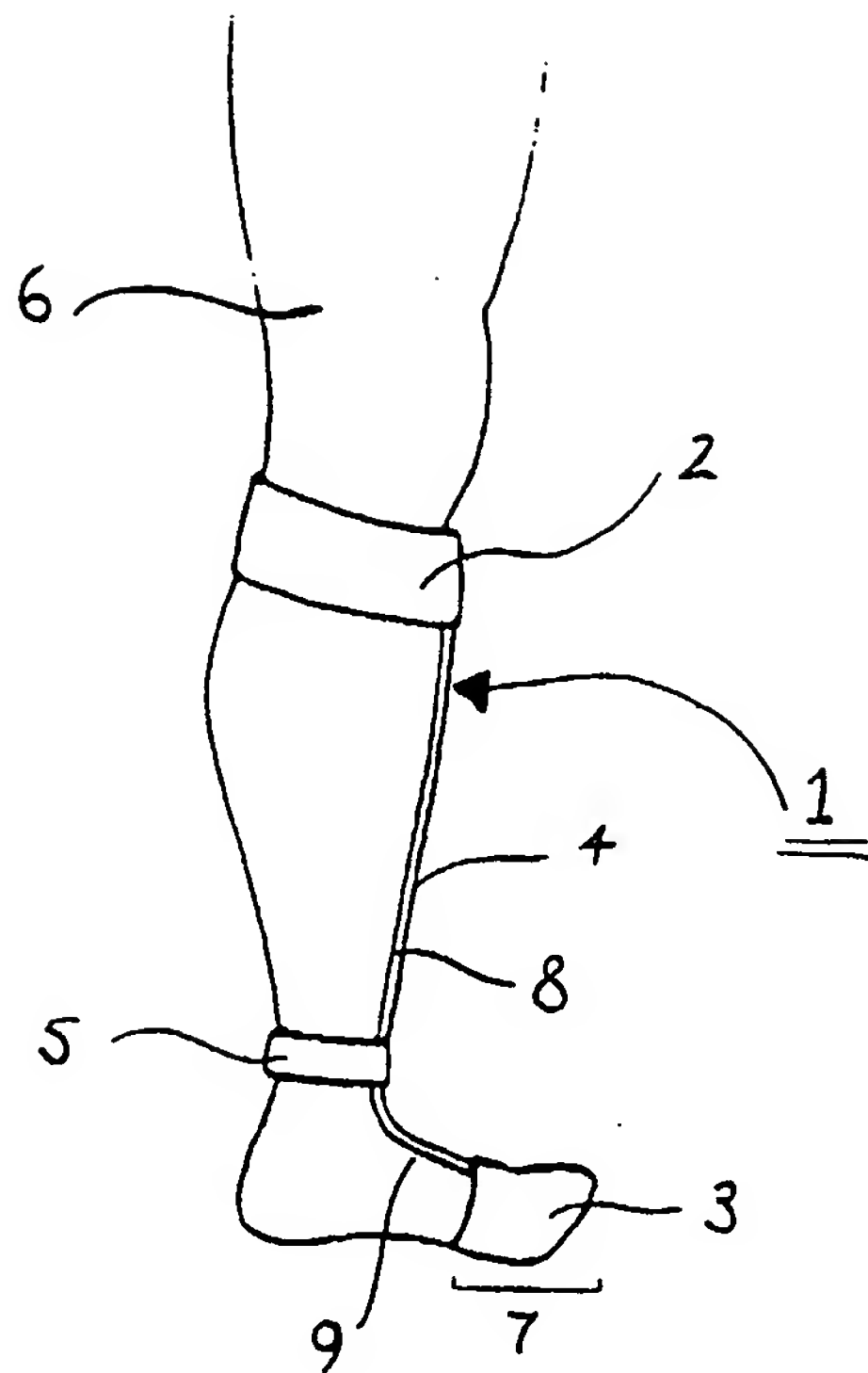


Fig. 1

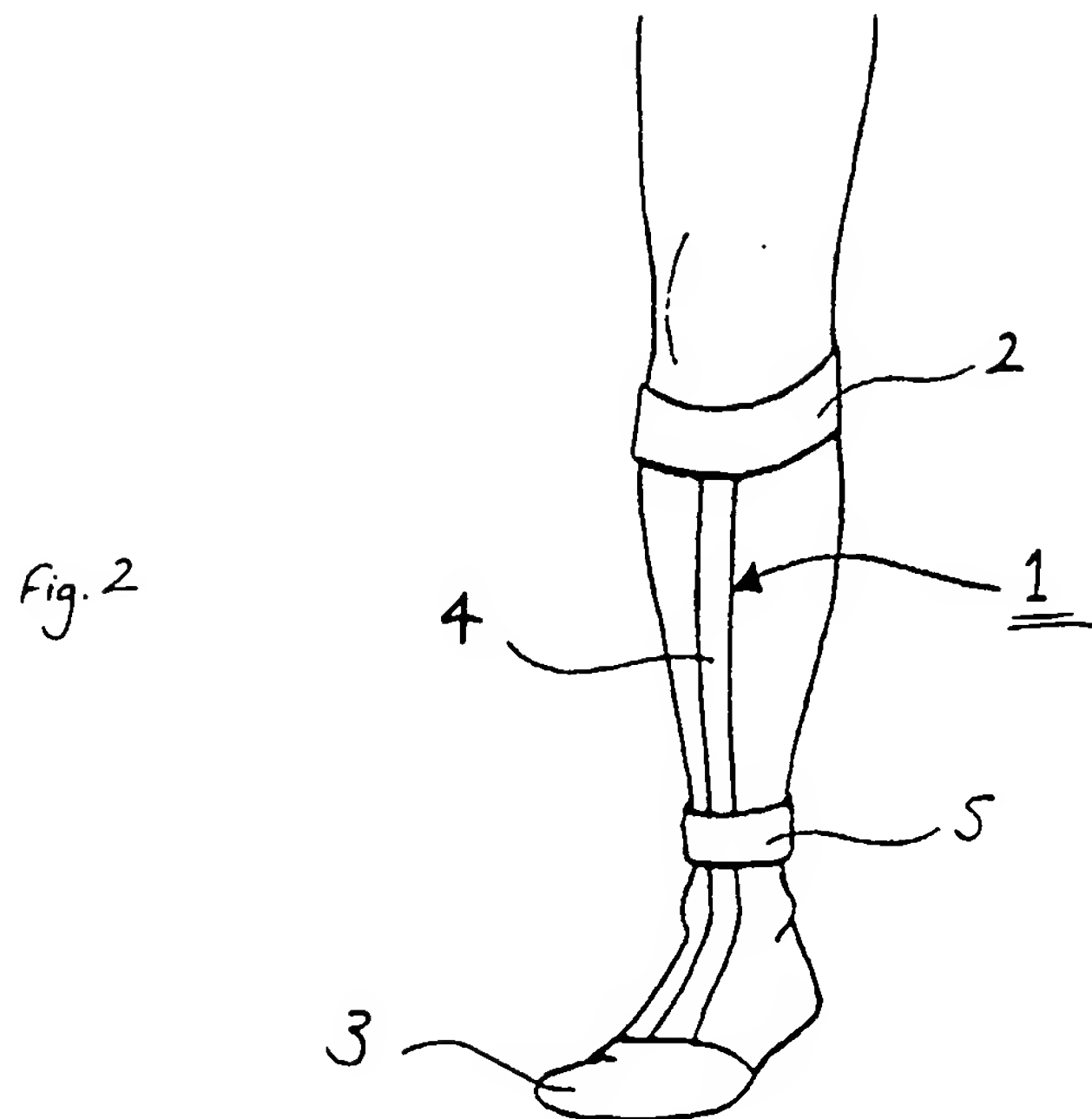


Fig. 2

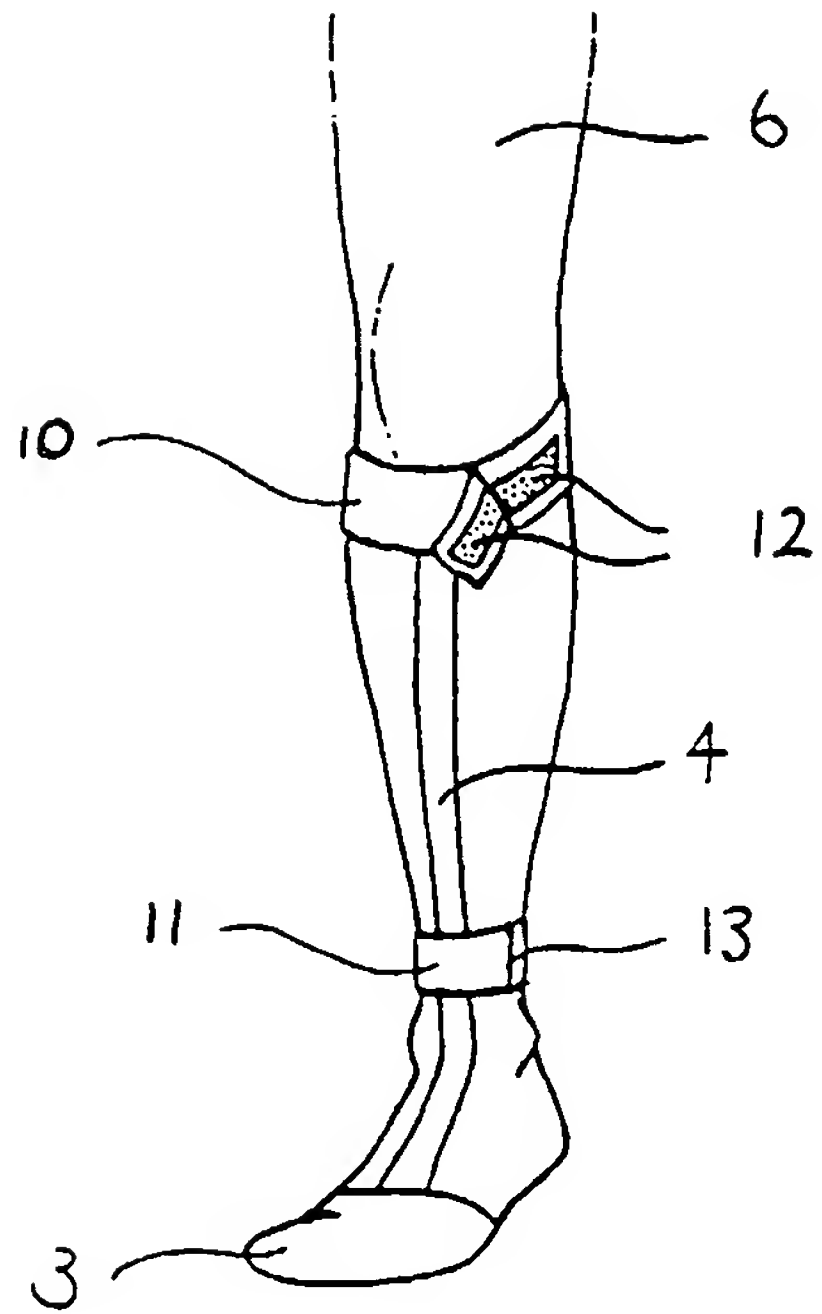
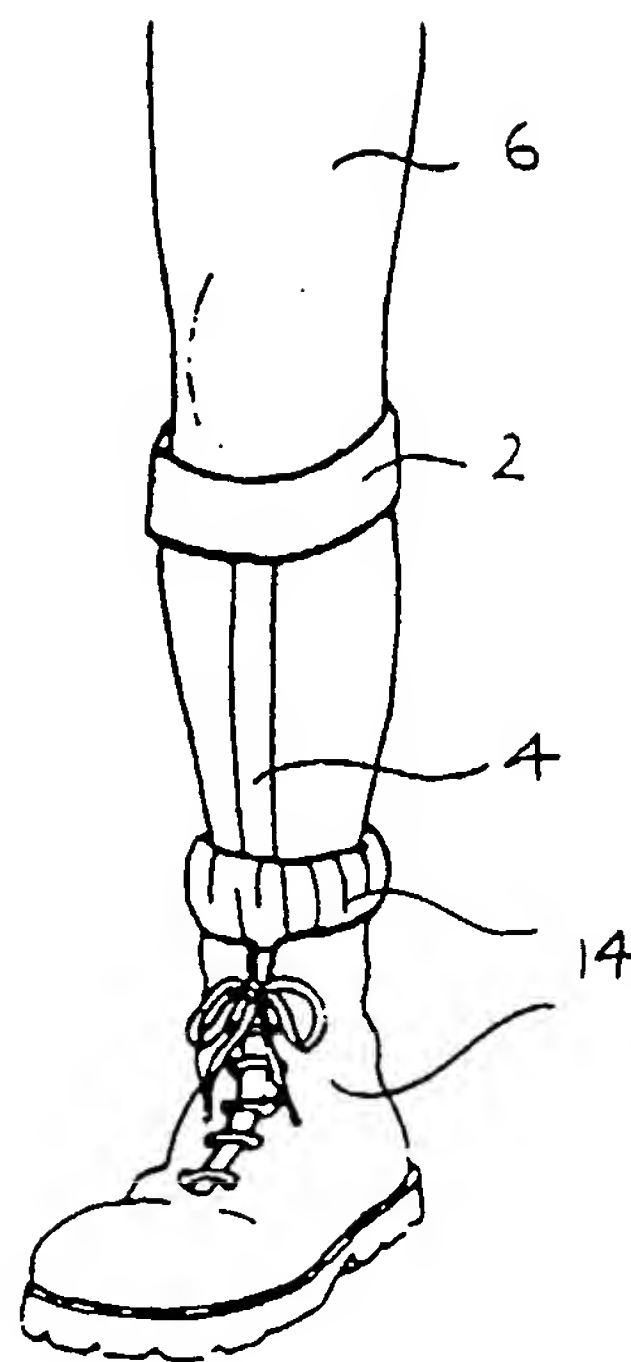


Fig. 3

Fig. 4



## Orthopaedic Device

This invention relates to orthopaedic devices and, more particularly, to an orthopaedic device for alleviating the symptoms of a condition known as foot  
5 drop.

Foot drop is a condition caused by the loss of full control of the muscles that raise and lower the foot. The condition is multi-causative, but is typically induced as a result of brain damage (for example, caused by a stroke or a  
10 cardiovascular accident), spinal injury, hereditary motor and sensory neuropathies, and muscle wasting diseases.

A particular problem experienced by foot drop sufferers is an inability to raise the foot when walking. As a result, an afflicted individual will drag the toe or  
15 inside edge of their foot along the ground. Consequently, the individual is unable to adopt a normal walking motion and faces an increased risk of injury caused by stumbling or falling whilst walking.

There are a number of orthopaedic devices in existence, designed to assist  
20 individuals overcome the condition and walk safely. However, many of those devices are unpopular because of aspects which make them bulky,

cumbersome, heavy and uncomfortable. In many cases, the device may be difficult to affix to and subsequently remove from the leg. Often the device is not concealable, i.e. it cannot be worn in conjunction with, or inside a regular shoe, and may present itself to the user and others as a bulky contraption.

5 Furthermore, foot drop devices are typically rigid and inflexible preventing normal articulation of joints, especially the ankle. This can often prevent a user from carrying out everyday tasks that require some level of ankle flexibility.

It is an object of the present invention to alleviate at least some of these  
10 problems.

According to this invention therefore there is provided an orthopaedic device for alleviating symptoms of foot drop comprising: a first portion arranged to encompass a circumference of a patient's leg; a second portion arranged to  
15 receive a toe region of the patient; and a substantially inelastic strip of material attached at one end to the first portion and at the other end to the second portion; said device being arranged such that in use a degree of tension is maintained along the length of the strip which substantially prevents the patient's foot dropping in a downward direction whilst walking.

20

It will be appreciated that the length of the inelastic strip will be determined by

- the leg length of the individual user and the specific design of the device. In some embodiments means may be provided for adjusting the length of the inelastic strip as required by the patient, alternatively the strip may be of a predetermined length. In each embodiment however, the strip will be of a length such that in use, tension is maintained along the length of the strip to a degree that prevents the patient's foot from dropping in a downward direction whilst walking. In this respect, the device allows an angle of approximately 90 degrees to be maintained between the patient's leg and foot.
- 10 In a preferred embodiment, the first portion is arranged to receive a circumference of the patient's leg between the knee and largest circumference of the patient's calf muscle, and a third portion is provided which is arranged to encompass a circumference of the patient's leg in an ankle region. It will be appreciated that the third portion of the device is provided to assist in
- 15 maintaining tension along the length of the inelastic strip so that an angle of approximately 90 degrees is maintained between the patient's leg and foot.

Preferably, the third portion of the device is attached to the inelastic strip.

- 20 The first and third portions of the device may each comprise an adjustable strap, which allows each portion to be tightened and secured around the

patient's leg. Typically, the straps will incorporate suitable fastening means, for example the adjustable straps may each be provided with hook and loop fastening means.

- 5 Preferably, the second portion of the device comprises a pocket which receives the toe region of the patient. The pocket will generally be made of a flexible material. For example, the toe region may be made of an elasticated material, or it may be of an inelastic material such as that used to make the inelastic strip.

10

Preferably the inelastic strip is made of Petersham fabric.

- Orthopaedic devices as described in the present application are close fitting and are not bulky. The devices can thus be worn comfortably and discretely under a
- 15 sock, or stocking and can also be worn inside a patient's shoe. The devices allow a patient suffering foot drop to walk in a more natural fashion with a reduced risk of injury caused by stumbling or falling. Furthermore, the devices do not restrict articulation of the ankle joint and thus allow the patient a greater degree of comfort and flexibility as compared with other devices currently
- 20 available.

Embodiments of the invention will now be described by way of example only with reference to the accompanying drawings in which:-

Figure 1 is a side perspective view of an orthopaedic device in accordance with  
5 an embodiment of the invention;

Figure 2 is a front perspective view of the orthopaedic device of Figure 1;

Figure 3 is a front perspective view like Figure 2 showing hook and loop  
10 fastening means; and

Figure 4 is a front perspective view like Figure 2 showing the device as worn under a sock and shoe.

15 An orthopaedic device 1 as shown in the accompanying drawings comprises; a first portion 2 which girdles a leg 6, a second portion 3 which receives a toe region 7, and an inelastic strip 4 attached at one end to the first portion 2 and at the opposite end to the second portion 3.

20 Figures 1 and 2 show an orthopaedic device 1 in which the first portion 2 girdles the leg 6 in a area defined between the knee and calf. A third portion 5

is also provided which girdles the leg 6 in an ankle region. In this particular embodiment, the portion 5 is provided to assist in maintaining a degree of tension along the length of the inelastic strip 4, whilst allowing for lateral flexibility of the foot. This is achieved by maintaining the strip in close contact  
5 with a front leg region 8 and an upper foot region 9 of leg 6. In this embodiment, the second portion 3 comprises a flexible pocket into which a user inserts the front toe region of their foot.

When the device is installed on a user's leg, the first portion 2 of the device  
10 acts as an anchor from which inelastic strip 4 extends in a downwards direction. The strip extends down the user's leg and then along the user's foot until it meets second portion 3 of the device to which the strip 4 is attached. The length of strip 4, in particular the length of the strip between the first and second portions of the device 2 and 3, is dependent on limb dimensions of the  
15 user. Means may be provided for manually adjusting the length of the strip, or the strip may be "made to measure". For example, suitable adjustment means could be a loop at the top of the strip 4 with adjustable fastening means, whereby the length of the strip 4 between the portions 2 and 3 may be varied. However, when properly fitted or adjusted the strip will be of a length that  
20 prevents the user's foot from dropping in a downward direction whilst walking. This is achieved by keeping the strip sufficiently taut and thus maintaining a

degree of tension along the strip which will resist a downward movement of the foot when the user walks so that an angle of approximately 90 degrees is maintained between the user's leg and foot.

- 5 In device 1, as shown in Figures 1 and 2, tension is maintained along the length of the strip with the assistance of the third portion 5 which secures the device to the user's ankle and helps to keep the device taut whilst allowing lateral flexibility of the foot.
- 10 Generally, inelastic strip 4, first portion 2, second portion 3 and third portion 5 are made of a flexible material, and the first, second and third portions 2, 3 and 5 are attached to inelastic strip 4 in any appropriate manner. For example, the portions 2, 3 and 5 may be sewn to the inelastic strip. However, it is not essential that third portion 5 be attached to the device.
- 15 The material from which strip 4 is made will be substantially inelastic. For example, the strip may be of Petersham fabric. However, the first, second and third portions 2, 3 and 5 may be of any suitable material, whether elastic or substantially inelastic.
- 20 The first and second portions 2 and 3 will typically comprise adjustable straps

10 and 11 as illustrated in Figure 3. Such straps will generally be made of a flexible material that can be tightened to fit specific leg dimensions of a user. In Figure 3 adjustable strap 10, positioned between the knee and calf muscle of leg 6, is adjusted tight enough to secure the strap about a circumference of a patient's leg, but not so tight as to impair blood circulation in the leg. In this respect, strap 10 provides an anchor point from which inelastic strip 4 extends in a downwards direction. In Figure 3, adjustable strap 10 is shown partially fastened revealing a hook and loop fastening mechanism 12, however any other appropriate fastening means could easily be substituted into the device. The adjustable strap 11 is shown in Figure 3 fastened around an ankle region of leg 6 and is adjusted tight enough such that strip 4 remains sufficiently in contact with a front region of the user's leg and an upper region of the user's foot, so that a sufficient degree of tension is maintained along the length of the strip 4 for the device to resist a downward movement of a user's foot.

An embodiment of the invention as it would appear when worn under a sock and shoe is illustrated in Figure 4. It will be appreciated that the sock and shoe 14 may function to assist in maintaining tension along the length of the device by keeping the strip in substantially close contact with the user's leg and foot.

An orthopaedic device for alleviating symptoms of foot drop, as hereinbefore

described provides a close fitting, non-bulky device that is comfortable to wear and which allows the user a greater degree of ankle flexibility as compared with existing devices. Furthermore, the device is of a relatively simple construction and is easy to make. The device may also be flexible and, if  
5 constructed of fabric material, can be easily cleaned by washing on a regular washing machine cycle.

## Claims

1) An orthopaedic device for alleviating symptoms of foot drop  
comprising:

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a first portion arranged to encompass a circumference of a patient's leg;

a second portion arranged to receive a toe region of the patient; and

10 a substantially inelastic strip of material attached at one end to the first portion  
and at the other end to the second portion;

said device being arranged such that in use a degree of tension is maintained  
along the length of the strip which substantially prevents the patient's foot

15 dropping in a downward direction whilst walking

2) A device as claimed in claim 1, wherein the first portion is arranged to  
receive a circumference of a patient's leg between the knee and widest portion  
of the patient's calf muscle and a third portion is provided which is arranged to  
20 encompass a circumference of the patient's leg in an ankle region.

3) A device as claimed in claim 2, wherein the third portion is attached to the inelastic strip.

4) A device as claimed in claim 2 or claim 3, wherein the first and third  
5 portions each comprise an adjustable strap.

4) A device as claimed in any preceding claim, wherein said second portion substantially comprises a pocket which receives the toe region of the patient.

10

5) A device as claimed in any preceding claim, wherein said inelastic strip is made of Petersham fabric.

6) An orthopaedic device substantially as hereinbefore described with  
15 reference to and as shown in the accompanying drawings.



INVESTOR IN PEOPLE

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Claims searched: All

Examiner: Mark S Pritchard  
Date of search: 29 April 2002

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:  
UK CI (Ed.T): A5R RFB (R3)  
Int CI (Ed.7): A61F 5/01  
Other: WPI PAJ EPODOC

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 1,060,717 A1 GAYMAR INDUSTRIES INC. (Whole document especially colun 5 lines 9-10 and 34-35, and Figs)	1 at least
X	WO 01/35876 A1 TIIKALA (Whole document especially Fig. 1 and the associated description)	1 at least
X	US 5,776,090 A BERGMANN <i>et al</i> (Whole document)	1 at least
X	US 5,718,673 A SHIPSTEAD (Whole document especially Figs 1-3 and column 2 lines 4 and 24-25)	1 at least
X	US 5,609,568 A ANDREWS (Whole document)	1 at least
X	DE 91 00 531.0 U HARTMANN SCHUHHAUS ORTHOPÄDIE GmbH (Figs 1-4)	1 at least

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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